AMENDMENTS TO THE CLAIMS

1. (currently amended) A method for positioning pulses in time, comprising:

(a) positioning pulses within a specified time layout in accordance with one or more codes to produce a pulse train having a predefined spectral characteristic,

wherein a difference in time position between adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic differs from another difference in time position between other adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic.

2. (original) The method according to claim 1, further comprising

(b) shaping a code spectrum in accordance with a spectral template such that a predefined code characteristic is preserved.

3. (original) The method according to claim 2, wherein said predefined code characteristic comprises a correlation property.

4. (original) The method according to claim 3, wherein said correlation property comprises a cross-correlation property.

5. (original) The method according to claim 3, wherein said correlation property comprises an auto-correlation property.

6. (original) The method according to claim 2, wherein said predefined code characteristic comprises a spectral property.

7. (original) The method according to claim 2, wherein said code spectrum is minimized.

8. (original) The method according to claim 7, wherein a difference between said code spectrum and said spectral template is minimized.

9. (original) The method according to claim 8, wherein said difference is a weighted difference.

10. (original) The method according to claim 2, wherein said spectral template includes a spectral notch defined by a notch frequency.

11. (original) The method according to claim 10, wherein said notch frequency is a predefined frequency f_{null} and wherein said step (b) comprises:

(1) initializing a counter i;

(2) forming a random word $\boldsymbol{p}$ of length N/2 from the alphabet P;

(3) ordering, for each p_i in said random word **p**, one or more associated phasers f_i, resulting in a set of balanced phasers;

(4) replacing letters in said random word $\boldsymbol{p}$ by said set of balanced phasers resulting in a word $\boldsymbol{f}$ of length N from the alphabet F,

(5) calculating a time-hopping code C_i of length N with a spectral notch at the frequency f_{null}, including calculating $T_k^{(i)}$ wherein $T_k^{(i)}$ is equal to $(1/f_{null})(f_k + n_k)$;

(6) storing said time-hopping code C_i;

(7) incrementing said counter i; and

(8) determining if said counter i is greater than M, if so then ending, and if not then repeating said steps (2)-(8).

12. (original) The method of claim 11, wherein said step (3) comprises ordering randomly.

13. (original) The method of claim 1, wherein said one or more codes comprises at least one of:

a hyperbolic congruential code;

a quadratic congruential code;

a linear congruential code;

a Welch-Costas array code;

a Golomb-Costas array code;

a pseudorandom code;

a chaotic code; and

an optimal Golomb Ruler code.

14. (currently amended) An impulse transmission system configured to generate a

spectral notch at a predefined frequency f_{null}, the system comprising:

a transmitter configured to transmit a pulse train,

wherein said transmitter is operative to position pulses within a specified time layout in accordance with one or more codes to produce said pulse train having a predefined spectral characteristic,

wherein a difference in time position between adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic differs from another difference in time position between other adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic.

15. (original) The system according to claim 14, wherein said transmitter is operative to shape a code spectrum in accordance with a spectral template such that a predefined code characteristic is preserved.

16. (original) The system according to claim 14, wherein said transmitter is an ultra wideband (UWB) transmitter.

17. (currently amended) A system having a transceiver configured to avoid interfering with a narrow band system, the system comprising:

a transceiver configured to transmit and receive a pulse train that avoids interfering with a narrow band system,

wherein said transceiver is operative to position pulses within a specified time layout in accordance with one or more codes to produce said pulse train having a predefined spectral characteristic,

wherein a difference in time position between adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic differs from another

difference in time position between other adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic.

18. (original) The system according to claim 17, wherein said transceiver is operative to shape a code spectrum in accordance with a spectral template such that a predefined code characteristic is preserved.

19. (original) The system according to claim 17, wherein said transceiver is an ultra wideband (UWB) transceiver.

20. (currently amended) A system having a receiver configured to reject interference from a narrow band system, the system comprising:

a receiver configured to receive a pulse train and to reject interference from a narrow band system at a frequency f_{null} corresponding to a frequency of the interference of the narrow band system to be rejected,

wherein said receiver is operative to position pulses within a specified time layout in accordance with one or more codes to produce said pulse train having a predefined spectral characteristic,

wherein a difference in time position between adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic differs from another difference in time position between other adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic.

21. (original) The system according to claim 20, wherein said receiver is operative to shape a code spectrum in accordance with a spectral template such that a predefined code characteristic is preserved.

22. (original) The system according to claim 20, wherein said receiver is an ultra wideband (UWB) receiver.

23. (currently amended) A radar system operative to avoid interfering with a narrow band system, the system comprising:

a radar transmitter operative to avoid transmitting at a predefined frequency fnull corresponding to a frequency of the narrow band system to be avoided, and configured to transmit a pulse train,

wherein said radar transmitter is operative to position pulses within a specified time layout in accordance with one or more codes to produce said pulse train having a predefined spectral characteristic,

wherein a difference in time position between adjacent pulses of said pulses positioned to produce said <u>predetermined</u> spectral characteristic differs from another difference in time position between other adjacent pulses of said pulses positioned to produce said <u>predetermined</u> spectral characteristic.

24. (original) The system according to claim 23, wherein said radar transmitter is operative to shape a code spectrum in accordance with a spectral template such that a predefined code characteristic is preserved.

25. (original) The system according to claim 23, wherein said radar transmitter is an ultra wideband (UWB) radar transmitter.

26. (original) The radar system according to claim 23, wherein said predefined frequency f_{null} corresponds to a personal communications systems (PCS) frequency band.

27. (original) The radar system according to claim 26, wherein said predefined frequency f_{null} corresponds to a 1.9MHz frequency band.

28. (original) The radar system according to claim 23, wherein said predefined frequency f_{null} corresponds a global positioning system (GPS) frequency band.

29. (original) The radar system according to claim 26, wherein said predefined frequency f_{null} corresponds to at least one of a 1575.42 MHz, and a 1227.60 MHz frequency bands.

30. (original) The radar system according to claim 23, wherein said predefined frequency f_{null} corresponds to an industrial scientific medical (ISM) band.

31. (original) The radar system according to claim 30, wherein said predefined frequency f_{null} corresponds to at least one of a 902-928 MHz, a 2.4-2.483 GHz, and a 5.725-5.875 GHz frequency bands.

32. (currently amended) A method of generating a time-hopping code having a spectral notch at a frequency f_{null}, the method comprising:

(a) defining the frequency f_{null}

(b) determining a code length N; and

(c) calculating a time-hopping code of length N with a spectral notch at the frequency f_{null},

wherein a difference in time position between adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic differs from another difference in time position between other adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic.

33. (original) The method according to claim 32, wherein said step (c) comprises:

(1) calculating a set of associated ordered phasers f_k; and

(2) calculating a time-hopping code T_k wherein T_k is equal to $(1/f_{\text{null}})(f_k + n_k)$, and wherein n_k is an arbitrary integer.

34. (original) The method according to claim 33, wherein said step (2) comprises:

(A) choosing n_k so as to satisfy a constraint.

35. (original) The method according to claim 34, wherein said constraint comprises at least one of:

maintaining an average pulse repetition frequency (PRF);

maintaining at least one of low cross-correlation and auto-correlation properties of the time-hopping code; and

minimizing spectral peaking of the code spectrum.

36. (original) The method according to claim 33, wherein said step (1) comprises:

(A) constructing a number of opposite phaser pairs (f_k, f_{k+1}) wherein for each pair a first frequency f_k is chosen randomly and a second frequency f_{k+1} is chosen to be 180 degrees opposite the first frequency f_k.

37. (original) The method according to claim 33, wherein said step (1) comprises:

(A) arranging N phasers evenly around a unit circle such that the distance between adjacent phasers is 2Π radians.

38. (original) The method according to claim 33, wherein said step (1) comprises:

(A) constructing a first subset of phaser pairs (f_k, f_{k+1}) wherein for each pair a first frequency f_k is chosen randomly and a second frequency f_{k+1} is chosen to be 180 degrees opposite the first frequency f_k; and

(B) arranging a second subset of phasers evenly around a unit circle such that the distances between any pair of adjacent phasers are all equal.

39. (original) The method of claim 32, further comprising:

(d) using another code-generation technique.

40. (original) The method of claim 39, wherein said another code-generation technique comprises at least one of:

a code producing an auto-correlation property; and

a code producing a cross-correlation property.

41. (original) The method of claim 39, wherein said another code-generation technique comprises at least one of:

a hyperbolic congruential code;

a quadratic congruential code;

a linear congruential code;

a Welch-Costas array code;

a Golomb-Costas array code;

a pseudorandom code;

a chaotic code; and

an optimal Golomb Ruler code.

42. (currently amended) A method for positioning pulses in time, comprising:

positioning pulses within a specified time layout according to one or more codes to produce a pulse train having one or more predefined spectral characteristics,

wherein a difference in time position between adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic differs from another difference in time position between other adjacent pulses of said pulses positioned to produce said predetermined spectral characteristic.

43. (original) The method of claim 42, further comprising

shaping a code spectrum spectral characteristic in accordance with a spectral template at a predefined frequency, f_{null}, including preserving a predefined code characteristic.

44. (original) The method of claim 42, wherein said specified time layout comprises a non-allowable region.